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Chief Ranger Forest Townsley reports that a pair of Harlequin Ducks have visited the Yosemite for a number of years. We hope to see them again next year and to have another try for their nest. Last year we noted a lone female as late as July 28.

From the available literature on the subject one might get the impression that Harlequin Ducks are silent birds. However, this was not the case with the particular pair which we had under observation. When the birds were together the male carried on a low, chatty conversation much of the time. The female was more or less silent, and appeared only to speak when she wished to chide her mate. Besides these chatty notes the male had another call, which he uttered in moments of excitement, or when he wished to attract attention. This was a loud, clear "qua, qua, qua," uttered in rapid succession. Occasionally just a single note was uttered which was particularly loud and clear. The low notes might remind one of the conversational notes of the Coot, but the loud call was quite distinctive and could not be compared with the notes of other water birds with which we are familiar.

*Yosemite, Calif.*



## A MYRTLE WARBLER INVASION.

BY CHARLES L. WHITTLE.

FROM February 21, 1920 to March 4, 1920, my wife and I spent the entire daylight time bird cruising about Savannah, Georgia, and Beaufort, Walterboro and Charleston, South Carolina. In addition, several excursions were made for ten or twenty miles south and east of Walterboro. With the exception of February 21 and March 4, the temperature was considerably below the normal for this section of the State and the season was correspondingly late. In fact official reports of the U. S. Weather Bureau for the entire month of February, 1920, show a subnormal average temperature, not only for South Carolina as a whole but for

Georgia and Florida as well. The averages and departures therefrom as a whole were:

	AVERAGE TEMPERATURE	DEPARTURE FROM NORMAL.
February, 1920 South Carolina.....	42.8	—4.10
Georgia.....	46.0	—1.40
Florida.....	57.1	—2.90

The averages and deficiencies of coast stations from Charleston to Key West, Florida, during this period were as follows:

	AVERAGE TEMPERATURE	DEPARTURE FROM NORMAL.
February, 1920 Charleston, S. C.....	48.2	—3.50
Savannah, Georgia....	49.5	—3.00
Jacksonville, Fla.....	53.9	—3.00
Miami, Fla.....	64.2	—4.00
Key West, Fla.....	68.2	—2.60

Between February 21 and March 3, Myrtle Warblers (*Dendroica coronata*) were met with every day as single individuals, as groups of two or three, or forming part of a band of other birds such as Ruby-crowned and Golden-crowned Kinglets, Carolina Chickadees, White-eyed Vireos, American Goldfinches, Pine, Palm and Yellow-Palm Warblers, Tufted Titmice, etc.

There was no evidence so far as we could detect that plans were underway among the Myrtle Warblers to begin their northward migration; and even the customary movements north and south among migrating species generally, due to alternating unseasonably warm or cold weather, was not apparent as the temperature remained so persistently subnormal during this period, not only in the territory under observation, but, as shown above, throughout Georgia and Florida. The principal evidence that the nesting season was approaching was a slight brightening of the plumage due to an increase in the distinctness of the yellow patches on the sides of the breasts of some of the Myrtle Warblers. Flocks of these birds even ten in number, were nowhere met with during this time, and this was true also of the South Carolina coast region where the Cumberhee River enters the tidal marshes southwest of Charleston, as late as March 2.

On March 3, we journeyed from Walterboro to Charleston, S. C., this city lying about thirty miles a little south of east of the former town; and on the following day we crossed Charleston harbor and went by trolley to the southwest end of Long Island which is locally known as the Isle of Palms. This island is merely a sand bar, about due east of Charleston, with the ocean on one side and an extensive salt marsh on the other. Many dunes occur here and these and the intervening hollows are covered in large part with dense thickets of a composite growth, but wax myrtle, so common a mile to the southwest, is practically absent.

We left the car at nine o'clock. The day was fair. A gentle easterly breeze was blowing and for the first time for twelve days the weather was distinctly summer-like, the thermometer on the street in Charleston at two o'clock registering 70 degrees.

Birds generally were not plentiful in the shrubbery, but overhead, flying northeast up the coast, were many flocks of small birds. Some flocks flying high could only be detected by the feeble calls of the birds, but other flocks were moving only a little above the land and could be identified as Myrtle Warblers by their call note. All flocks viewed at short range were seen to be composed entirely of this species. During our stay here of an hour there was a steady succession of warbler flocks flying up the coast, but only an occasional bird sought the shrubbery for rest or food.

A broad tidal stream separates the southwest end of Long Island from Sullivan Island, which is a similar sand bar trending in the same direction, and forming practically a continuation of the former island. The complex chaparral of Long Island disappears almost completely upon crossing the tidal stream and a miniature forest of wax myrtle trees (*Myrica cerifera*) takes its place, while the sand dunes become much less pronounced. Here a great change in the behavior of the birds was observable. Myrtle Warblers swarmed everywhere feeding at times but working up the coast slowly. There were warblers on the outer beach close to the water; on the shingle beaches and on their accompanying patches of seaweed. Every shrub and tree had one or more birds searching for myrtle berries of which there were scarcely any in this immediate vicinity. They alighted on and flew beneath the piers of the oyster fishermen; clambered over piles of oyster shells;

searched the inside and outside of fishing boats lying on the shore; inspected the chimneys and the sides of the fishermen's houses; looked over the weather-beaten fences and visited the marshes, a veritable host of inquisitive and, I believe, hungry birds bound for the North and feeding as they went and in this army there was no other kind of bird whatever.

As a rule the growth of their nuptial plumage was insufficiently advanced readily to identify the sexes. All the birds still wore their winter coats. As far as could be detected without the bird in the hand, there was no other indication of their summer plumage except that the yellow patch opposite the bend of the wing appeared slightly more apparent than during midwinter.

Perhaps half a mile from the northeast end of Sullivan Island the belt of wax myrtle trees narrows to a width, measured northwest and southeast, of about three hundred feet. Here, near a seashore resort, a road had been recently cut across the belt of wax myrtle trees at right angles to the sand bar. Streams of warblers flying along the shore northeasterly from Folly and Morris Islands, just south of the entrance to Charleston harbor, dropped to the land and converged at the southwest end of the mantle of myrtle trees and passed across the open swath cut for the new road. Posting ourselves here we counted the birds moving northeast, minute by minute as they passed the opening, for half an hour. The flight was continuous, many of the birds lighting on the ground and trees from time to time, and the number crossing per minute varied from twenty to two hundred, and accordingly averaged about one hundred per minute. As far as we could judge the number was no greater than it had been all the time since our arrival at the shore. Taking, therefore, the average at one hundred per minute, 24,000 Myrtle Warblers passed northward between nine in the morning and one in the afternoon. Not only so, but additional warblers passed close by both to the east and to the west of the stream of birds under observation. No doubt also the migration began prior to nine in the morning and did not cease at one in the afternoon. The line of migration passed directly across Charleston harbor entrance, there being no tendency for the birds to follow the shore line of the deep harbor reëntrant. This course is mentioned because it is believed to be a practice fol-

lowed quite generally as the birds move northeast and helps to explain certain anomalous dates of arrival at northern stations during the spring migration,

Where did all these warblers come from, and in what manner did so large a concentration take place? Is it customary for Myrtle Warblers to migrate northward earlier along the Atlantic seacoast than close by in the interior, as was the case on March 4, 1920, and, if so, how far in terms of date of arrival does such migration keep in advance of interior-moving birds? My own observations west and southwest of Charleston, above cited, make it fairly certain that the winter home of the warblers lay either in Florida or in some or all of the countries comprising the most southern portion of their range. I have been unable to find any published record of Myrtle Warblers, wintering in the United States, assembling in this manner and I have never before observed them in large numbers migrating northward without admixtures of other species of warblers or members of other families.

Published records show that late in February and early March Myrtle Warblers in numbers begin to arrive from tropical countries at Alligator Reef and Sombrero Key lighthouses in Florida; but among reports to me for the current year (1920) from lighthouse keepers at Sombrero Key, Dry Tortugas, American Shoal and Sand Key, only at the last mentioned station were any migrating birds of any kind observed prior to March 4, 1920. At Sand Key light-house, however, the keeper, Mr. C. G. Johnson, reports that the "Migration began on the night of February 8, when a great many land birds," referred to as "warblers and sparrows," passed the light. Mr. Johnson reports other large flocks of small birds passing this light going northward on February 13, 17, 24, 27, and on March 1. The movement on February 8, 13, and 27, and March 1, took place at night and on February 17 and 24, during daylight. Accurate information as to the names of the species of warblers composing these flocks is unfortunately lacking, but the arrivals noted correspond fairly closely in the matter of time with prior flights which are known to have included many Myrtle Warblers. That most of the warblers arriving in Florida from across the Gulf of Mexico at this season of the year may be safely regarded as of this species receives additional support from the

fact that the records show that but one or two other species of warblers reach Florida from the Tropics before March 1, and these in small numbers only. My own observations in Georgia and South Carolina during February and March, 1920, and throughout the peninsular portion of Florida during the corresponding period for several previous years, indirectly furnish probable if not confirmatory support of the contention that the assembling of such a multitude of Myrtle Warblers, wintering in these states, if of actual occurrence, is an unusual phenomenon. Summed up, the evidence tends to substantiate the view that among the birds from across the Gulf of Mexico arriving in Florida during the twenty-five days immediately prior to March 4, 1920, there were many Myrtle Warblers.

It thus appears reasonably certain that the greater part of this army of warblers arrived in southern Florida from Cuba, Jamaica or Central America during February and March, accompanied by few or no other species of warblers, in a succession of smaller flights. If I were to view this matter from my own experience, the island of Cuba would have to be excluded as a possible source, for during November and part of December, 1917, I was much afield in Havana, Santa Clara and Oriente Provinces and my notes make no mention of seeing a single Myrtle Warbler among the thirteen species of warblers found there. In Florida insect food in sufficient variety and abundance awaited their coming, the birds, however, probably worked northward along the east coast to the first area of wax myrtle, bearing fruit in quantity. Here the concentration observed is believed to have taken place because here their favorite vegetable food occurred in such abundance as to satisfy their needs. The supply of berries becoming exhausted at this locality, the birds again moved northward until a like area was encountered, the route taken being the main belt of myrtle bushes which closely follows the outer sand bars and sea beaches along northeastern Florida. The vegetable food supply thus influenced their migration speed, and its distribution determined the route followed; and this migration thus far north in Florida was in the main independent of local temperature excepting that on warm days like the fourth of March, coming after a period of unusually cool weather for the time of the year, the northward movement would no doubt be temporarily accelerated.

Along the entire coast of eastern Florida, part of Georgia, most of South Carolina, nearly the entire coasts of North Carolina, and Virginia, Maryland and Delaware, all of New Jersey (bordering the ocean) to Sandy Hook, the south shore of Long Island and much of Massachusetts to Maine, outer sand bars occur, separated from the mainland by narrow bodies of shallow water or salt marshes. These sand bars are often intersected by great arms of the sea like Chesapeake, Delaware and New York Bays. Many estuaries open through them, such as Port Royal Sound and Savannah Harbor. From eastern central Florida north to Maryland, following this long line of sand bars, two species of *Myrica*, bearing wax-covered seeds, reach their maximum development; and, as one goes inland, they decrease rapidly and practically disappear a short distance from the ocean or as high land is reached. The northern species (*M. carolinensis*) occurs along the entire coast from Nova Scotia to Florida and the southern form (*M. cerifera*) ranges from southern New Jersey south to Florida, along the Gulf coast to Texas and up the Mississippi valley to Arkansas. It is believed that the adherence of the early, tropically-wintering Myrtle Warblers to this seaside belt of *Myrica*, with its accompanying food supply, aided perhaps by the greater average warmth of this belt during such migration as compared with interior regions having the same latitude and much higher elevation, accounts for their arrival at certain places in New Brunswick and Prince Edward Island, near the coast, earlier than at more inland points well to the southwest, and it appears to be more than a coincidence that the northern limit of *Myrica carolinensis* is found in these two northern provinces where, in the case of Prince Edward Island, Myrtle Warblers on the average arrive April 26, thirteen days ahead of eleven other species of warblers, and nearly a week earlier than at certain Pennsylvania stations, below referred to, 600 miles to the southwest. Thus these birds are reported by W. W. Cooke (see Bulletin No. 18, U. S. Biological Survey, pp. 62 and 63) as arriving in New Brunswick a week earlier than at Philadelphia and Renovo, Pa., and at certain places in New Jersey (not specified). Philadelphia is located on the Delaware River just above sea level, about seventy-five miles from the ocean end of Delaware Bay, and fifty miles from the eastern coastal sand bars



along the New Jersey coast followed by the early migrants. Renovo lies on the Susquehanna River still further inland on the north side of the Appalachian Range and at a considerable elevation. It is reasonable to believe that the birds so reported reach these interior stations as part of the general, mixed, inland warbler movement of a later date. The state of New York affords a similar set of conditions by which to test this belief and fortunately fairly conclusive data bearing on the matter have been assembled by Eaton (see *Birds of New York*, Part 1, "County Schedules" tabulations). Eaton shows by the testimony of competent observers that this species reaches northern, central and western New York several days later than it is reported at nearly all coastal stations in this state.<sup>1</sup>

Mention has been made of the fact that the warblers moving northeast on March 4, did not follow the sinuosities of the shore line into Charleston harbor but cut straight across its entrance to other sand bars lying to the northward, and it is believed that this practice is adhered to all the way up the coast, at least as far as New England, the birds moving similarly across the entrance to other like waterways such as Chesapeake Bay, Delaware Bay (thus failing to reach Philadelphia seventy-five miles to the north) and the big reëntrant south and east of New York City, from Sandy Hook in New Jersey to the western end of Long Island, where they first appear from April 1 to 10. Staten Island, which lies at the extreme western end of Lower New York Bay, is passed by, the earliest date recorded for spring migrants here being April 22 (see Eaton's County Schedules referred to above).

The Atlantic seaboard is well known to be a wide and favorite route followed more or less closely by many species of birds in

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<sup>1</sup> There is one exception noted. Two observers furnished the migration notes from Tioga county and the "County Schedules" give two dates, March 30, as the earliest date and April 28 as the average date of first arrivals of Myrtle Warblers. Tioga county is one of an east and west tier of counties, forming the southern boundary of the state, adjoining Pennsylvania. The earliest dates for first arrivals in the counties adjoining Tioga county are April 23 (Broome county), April 24 (Chemung county), and April 10 to April 29 for the remaining counties. It is thus seen that March 30 is a very exceptional date for this section of the state and extremely local. I have been unable to secure full particulars of the occurrence of this warbler in Tioga county on March 30 or the year or years the observations were made. Wintering birds on Long Island may well have accidentally wandered there or have been blown westward by a powerful easterly wind.

their spring and fall migrations. During March an extremely narrow portion of this zone, namely the belt of sand bars lying next the ocean, appears to constitute an early migration highway for Myrtle Warblers (independent of interior migrating birds) which have wintered in the Tropics.

If it be true that these warblers came from tropical winter quarters, then the migrating instinct, no doubt preceded by physiological changes, developed earlier among birds that wintered under conditions of great humidity and high temperature than among those wintering in the cooler United States; and I have given temperature conditions during February for the three southern Atlantic states with comments on the behavior of the Myrtle Warblers wintering in Georgia and South Carolina to emphasize this fact and to contrast the absence of any observable migrating tendency among these birds wintering even thirty miles from the ocean near Charleston at a time when a host of the same species was moving by them northward along the coast.

*10 Chauncy St., Cambridge, Mass.*

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## PROBLEMS OF FIELD IDENTIFICATION.<sup>1</sup>

BY LUDLOW GRISCOM.

AT a meeting of the Linnaean Society of New York when a school boy, I reported having seen a Bicknell's Thrush, my identification being based on the erroneous supposition that its call-note was diagnostic. The resultant storm of criticism rendered me practically speechless. Then and there I planned to do my best to become a reliable observer and to investigate the scientific possibilities of sight identifications. So little did I have to say at that Linnaean Society meeting that my credibility was entirely eliminated, and for over two years nothing I reported was given any credence or entered in the proceedings. In the years that

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<sup>1</sup> Read before the thirty-ninth Meeting of the A. O. U. at Philadelphia November 10, 1921.